Enabling Collaborative Human-Machine (H-M) Decision Making in Time-critical Activities

Completed Technology Project (2015 - 2016)

Project Introduction

Self-adjusting autonomous systems (SAS) are spreading from well-defined control activities, such as manufacturing, to complex activities with multi-faceted human interactions and decision making, such as those involved in piloting an aircraft. SAS' ability to solve large problems of certain types far exceeds that of humans': problems with millions of variables and constraints are tractable for machines, while human decision making is far more limited in scope. However, an automated solution is only as good as the problem statement, including its completeness. Until SAS are proven and perceived to be as or more adaptable than humans, and resilient in the face of unanticipated (and therefore not included in decision making models) faults and variable conditions, humans will have to remain in ultimate control of decision making, while supported by machine-based information and advice. H-M interaction in many domains has numerous well-known and well-documented difficulties, including lack or excess of trust, both of which can lead to serious problems, especially in time-critical and safety-critical situations where human decision makers quickly become overwhelmed with information. In these situations, humans become either reluctant to take advice from machines or lose situational awareness and basic skills via overreliance on machines. Our overarching objective is to develop a concept and an associated software-enabled mechanism that will support real-time decision making in time-critical and safety-critical activities.

Anticipated Benefits

This project benefits all NASA's missions (airspace, aerospace, space, and science) that involve human-machine interactions.

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Center Innovation Fund: LaRC CIF

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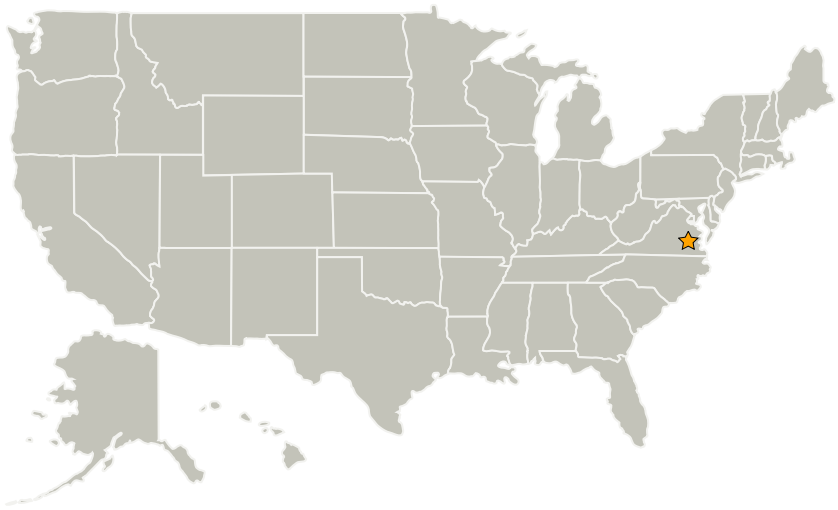
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia

Project Management

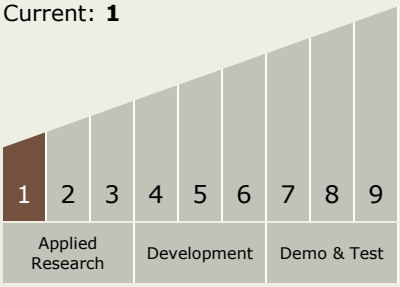
Program Director:
Michael R Lapointe

Program Manager:
Julie A Williams-byrd

Principal Investigator:
Natalia Alexandrov

Technology Maturity (TRL)

Start: **1**
Current: **1**



Technology Areas

Primary:

- TX16 Air Traffic Management and Range Tracking Systems
  - TX16.3 Traffic Management Concepts